Claims

We Claim:

1) A composition of matter comprising an aerogel having a high density of hydroxyl groups.

2) The composition of matter of claim 1, wherein said aerogel is a ceramic oxide.

3) The composition of matter of claim 2, wherein said ceramic oxide is selected from the group consisting of silica, alumina, aluminosilicate, and combinations thereof.

4) The composition of matter of claim 1, wherein said hydroxyl groups are greater than preferably greater than 1 hydroxyl groups per square nanometer of the surface of the aerogel.

5) The composition of matter of claim 1, wherein said hydroxyl groups are greater than preferably greater than 3 hydroxyl groups per square nanometer of the surface of the aerogel.

6) The composition of matter of claim 1, wherein said hydroxyl groups are greater than preferably greater than 5 hydroxyl groups per square nanometer of the surface of the aerogel.

7) The composition of matter of claim 1 wherein said aerogel having said high density of hydroxyl groups has pore sizes of between 150 Å and 250 Å and bottlenecks of between 110 Å and 150 Å.

8) A method for forming an aerogel having a high density of hydroxyl groups comprising the step of exposing an aerogel to a mixture of water and a supercritical fluid.

9) The method of claim 8, wherein said aerogel is provided as a ceramic oxide.

10) The method of claim 8, wherein said ceramic oxide is provided as selected from the group consisting of silica, alumina, aluminosilicate, and combinations thereof.

11) A composition of matter comprising an aerogel having pore sizes of between 150 Å and 250 Å and bottlenecks of between 90 Å and 150 Å.

12) The composition of matter of claim 11, wherein said aerogel is a ceramic oxide.

13) The composition of matter of claim 12, wherein said ceramic oxide is selected from the group consisting of silica, alumina, aluminosilicate, and combinations thereof.

14) A composition of matter comprising an aerogel having a pore size distribution of less than 50% of the mean pore diameter.

15) The composition of matter of claim 14, wherein said pore size distribution is less than 20% of the mean pore diameter.

16) The composition of matter of claim 14, wherein said pore size distribution is less than 10% of the mean pore diameter.